Plastic Traps for Detection and Survey of the Mediterranean Fruit Fly, *Ceratitis Capitata* (Diptera: Tephritidae) In Morocco[1]

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In 1968, the Government of Morocco's Direction de la Recherche Agronomique (DRA) and the United States Agency for International Development (USAID) agreed to explore the use of the sterile-insect release method to control the Mediterranean fruit fly, *Ceratitis capitata* (Wiedemann), in Morocco (Harris, 1970). The Mediterranean fruit fly (medfly) is a serious pest of peaches, *Prunus persica* (L.), *Citrus* spp., loquats, *Eriobotrya japonica* (Thunberg), apricots, *P. armeniaca* L., plums, *P. cerasifera* Ehrhart, pears, *Pyrus communis* L., figs, *Ficus carica* L., cactus, *Opuntia ficus-indica* (L.) Mill., and the argan tree, *Argania spinosa* (L.) Skeels. Data on medfly seasonal abundance, population trends, and host preference were needed for at least a year's duration from different regions in Morocco to select a test site for a feasibility study. Previously, medfly population studies had been made with "gobe-mouche" traps by Haltebourg (1966). New studies of medfly population ecology were started in the province of Marrakech using the male attractant trimedlure (Beroza et al., 1961).

Population trends and the timing of insecticide applications for medfly control are determined by the use of the Procida plastic trap and the gobe-mouche glass trap (McPhail, 1937). The gobe-mouche trap was effective but due to the need of water in it to catch flies, a minimum weekly servicing interval was required. The gobe-mouche trap was not satisfactory for determining population trends simultaneously in all major regions of the country where medflies were reported as being present. The Procida and Steiner traps, though imports, were suitable but not economical enough or available in quantity. For our purposes, plastic traps (Steiner, 1957), sticky traps (Harris et al., 1971) or equivalents baited with trimedlure requiring servicing every 3 or 4 weeks would best meet our needs for detecting medflies in various locations and under all conditions in Morocco.

We report here results of tests with plastic traps in Morocco during the period 1970-1972.

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[1]Mention of a pesticide or a commerical or proprietary product does not constitute a recommendation or an endorsement of the product by the USDA.

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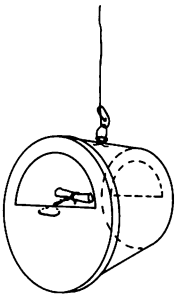
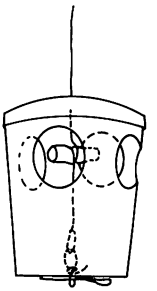
Materials and Methods

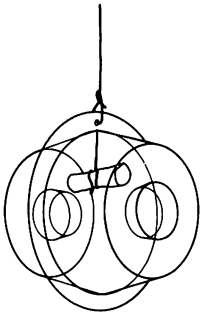
The Procida trap was constructed from two dividable, light ambercolored, and transparent plastic sections 9 cm wide and 13 cm in diam, with a 4-cm opening for entry of medflies (Fig. 1). The trap was baited with 2 ml of lure consisting of 70% trimedlure and 30% naled in a wick 1 cm in diam and 4 cm long.



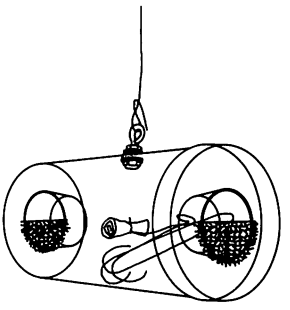
Moroccan Horizontal (Type A)



Moroccan Vertical (Type



Procida



Steiner

Fig. 1. Types of traps used to catch Mediterranean fruit flies: moroccan trap A (horizontal) and B (vertical), Procida trap, and Steiner trap.

The 0.9-liter Steiner trap (Fig. 1) is tapered and constructed from tapered transparent polystyrene plastic 14.5 cm long, 10.5 and 8.7 cm in diam at the ends with a 4.5-cm-diam opening at each end partially blocked with screen but permitting entry of medflies. The trap was baited with 2 ml of lure as indicated previously in a wick 1 cm in diam and 4 cm long.

Two Moroccan trap designs (Fig. 1) were made from 1-liter white opaque plastic cups with black covers: (A) horizontal trap with 1/2 of each end cut out from a conical tapered cylindrical plastic container 11 × 11.5 × 9.1 cm so that the open sections were opposite each other, permitting easy

access to the lure by medflies, and (B) vertical trap with 4 holes 3 cm in diam with each of the two pairs facing each other 1.5 cm from the top of the trap. These traps were baited with 2 ml of a mixture of 70% trimedlure and 30% naled in a cotton wick 4 cm long and 1 cm in diam.

Horizontal and vertical Moroccan traps were compared to evaluate their efficiency and durablity in citrus fruit orchards in three locations (Table 1). Thirty pairs of these traps were used at Marrakech, 17 at Chichaoua, and 25 at Agadir Agricultural Centers. In later tests, Procida and Steiner traps were compared with the Moroccan traps. The lure in these traps was replenished at 4- to 5-week intervals. Each trap included ca. 0.1 g WP mixture (50% chlordane + 1% lindane) to kill ants where they were a problem. All traps were suspended by short wire bails ca. 10 cm long. All traps were tested in a randomized block design in arid areas with an annual rainfall of 100-300 mm and temperatures ranging between 10° and 35° C.

Results and Discussion

Data from these experiments showed that the trap catches made by the vertical trap B were significantly better than those made by the horizontal trap at Chichaoua (Table 1). The same trends were evident in the two other locations where comparisons were made.

Table 1.—Summary of male Mediterranean fruit fly catches in Moroccan Traps A and B in citrus orchards in three locations in Morocco (1970-71)

Location	Trapping period (months)	No. of traps (replication)	Total catch		Mean catch	
			Trap A	Trap B	Trap A	Trap B
Agadir	6	25	27,792	28,205	1111.68	1128.2
Chichaoua	8	17	99,792	130,248	5870.12	7661.6++
Marrakech	14	30	36,510	42,032	1217.00	1401.07
Total	28	72	164,094	200,485	2279.08	2784.51

++Significant at the 5% level of confidence (ANVAR).

The Moroccan traps were made from plastic containers used to market glue. Observations made on the durability of these traps showed the quality of the plastic was good. The traps held up well with no visible adverse effects from heat or cold. The opaque black top and white color of the traps did not appear to adversely affect their efficiency.

TABLE 2.—Summary of male Mediterranean fruit fly catches in Moroccan traps A and B, Procida trap, and Steiner trap, Chichaoua, 1971

Trap type	No. caught within indicated interval (days)				Total catch*	Mean catch
	0-7	7-21	21-42	42-63		
Moroccan						
A-Horizontal	2235	646	418	84	3383	225.53
B-Vertical	2100	703	450	94	3347	223.13
Procida	1933	484	275	81	2273	184.87
Steiner	2368	412	287	69	3136	209.73

*15 replicates each trap over 63-day period.

Table 2 shows the results obtained in comparative tests of Moroccan, Procida, and Steiner traps. Although differences between mean trap catches were not significant, Moroccan traps catches were higher than those of the Procida or Steiner trap. From the viewpoint of cost, the Moroccan traps at 12¢ each compared most favorably with the costlier Procida and Steiner imported traps at 80¢ and $7.00, respectively. The cost differential is likely to increase and make the Moroccan traps even more competitive. The supply of the containers for making Moroccan traps will likely be constant because of the demand for glue.

The Moroccan traps developed were very efficient and completely satisfactory for determining medfly population trends in Morocco. The traps were economical and easily replaced. The designs were efficient and satisfactory for determining medfly population trends in Morocco. The designs were efficient and satisfactory for use with medfly male lures. The vertical design was enlarged and found to be equally efficient for food baits as for male lures. Nakagawa et al. (1975) used the vertical trap design as a replacement for the McPhail trap. Moreover, Moroccan technicians learned the procedure for research development of devices to meet their needs, using their own resources.

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